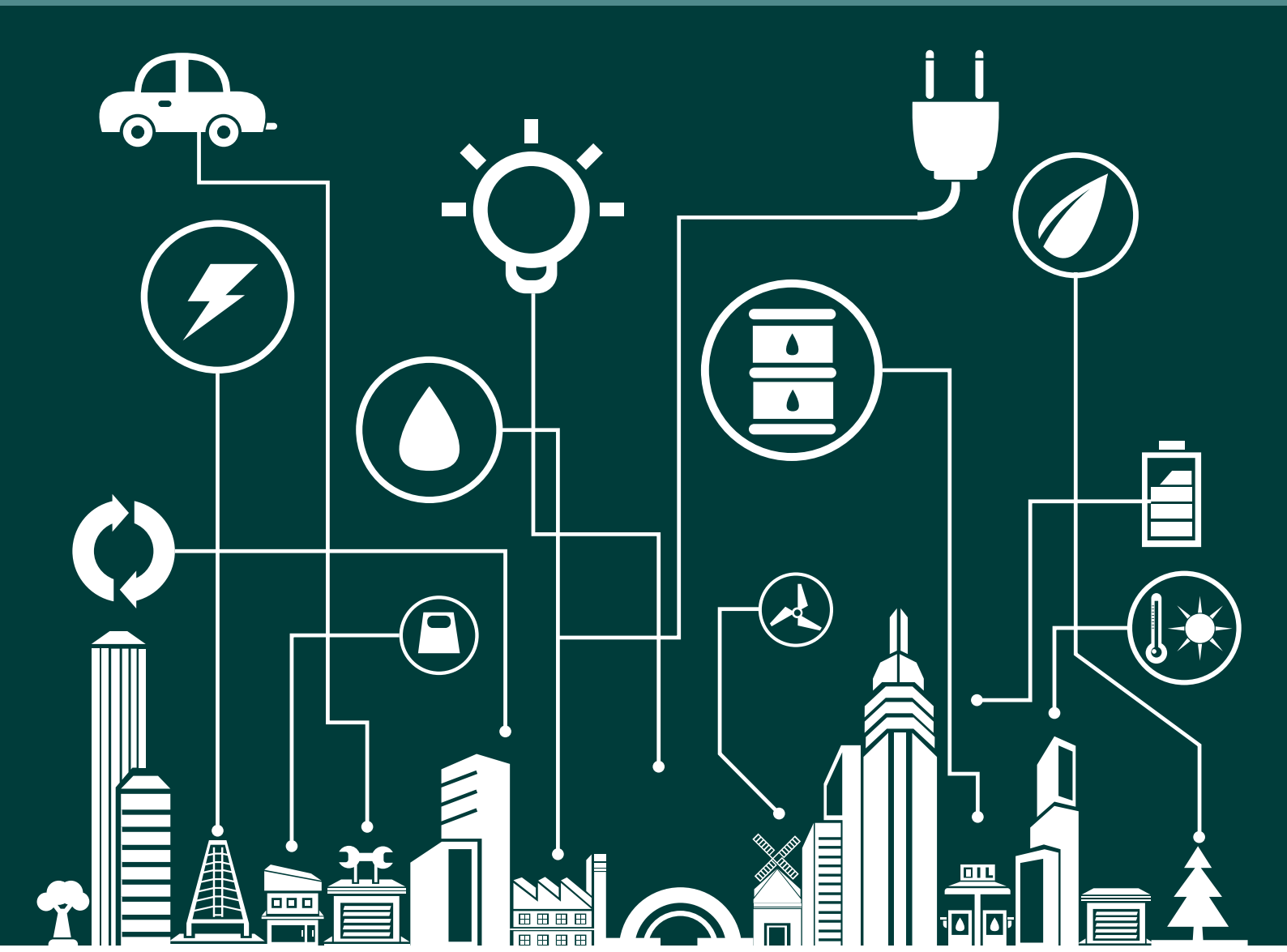
NBI Energy Efficiency Leadership Network

CASE STUDIES – 2014



This publication was sponsored by the
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ).
The National Business Initiative thanks the GIZ for its continued support.

CONTENTS

Foreword from the CEO: National Business Initiative

The National Business Initiative (NBI) is pleased to produce its 2014 edition of Energy Efficiency Case Studies. The NBI advocates for and supports a vision of a sustainable, thriving and equitable society. We do this through supporting both government and private sector policy implementation, facilitating partnerships to support action, and through projects that create platforms for companies to collaborate around a call to action.

Companies whose work is reflected in this publication, and who are members of the NBI's Energy Efficiency Leadership Network (EELN), are to be congratulated for their efforts and investments in energy efficiency as an important response to rising energy prices, energy supply constraints and the need to reduce greenhouse gas emissions.

These case studies demonstrate significant financial investment in energy efficiency through the companies' own resources and useful application of Eskom's Integrated Demand Management (IDM) scheme. In most cases there is an impressive return on investment from both the short payback periods and the energy savings.

Many of these companies have been implementing energy efficiency measures over many years, highlighting the need for continuous improvement given technology changes and the need to stay competitive. We also applaud companies who have taken a comprehensive energy management approach, including target setting and monitoring, behavioural change, capacity building, technology deployment, blended financing and public reporting, as these are the tenets of the EELN pledge.

The NBI began its energy efficiency programme in 2006 in response to government's request to rally the private sector behind the country's energy efficiency strategy, which set a target of a 12% reduction in energy consumption by 2015.

As we approach this deadline, the Department of Energy is reviewing its strategy and targets, and in the lead up to a new 2030 target intends to introduce mandatory energy reduction measures for companies with thresholds of 50 Megawatts of energy consumed annually. These companies will have to produce energy management plans and identify and implement saving opportunities. We encourage companies to take advantage of the 12L tax incentive that has been introduced to support the private sector's energy efficiency investments.

We are gratified that companies who have participated in our EELN and its predecessor, the Energy Efficiency Accord, have heeded the call to action and illustrated through investment and action their commitment to continuous energy efficiency improvement. The case studies in this publication are evidence of this. The NBI also acknowledges the role our partners have played in supporting the network and its members, including the Department of Energy, Eskom, SANEDI, the Industrial Energy Efficiency Project, the Green Building Council, GIZ and many others. Over time, EELN members have also valued the collective approach by sharing best practice with each other.

The NBI is also pleased that, through its track record in energy efficiency work, it was able to attract funding from the UK's Department for International Development, and with support from the Department of Energy is able to implement the countrywide Private Sector Energy Efficiency Programme. This programme provides energy efficiency support to large, medium and small companies across many sectors.

Companies interested in benefiting from this programme, can visit **www.psee.org.za** or call our toll free line at **0801 113 943**.

Joanne Yawitch
Chief Executive Officer

Message from the Chairman: Energy Efficiency Leadership Network

The Energy Efficiency Leadership Network (EELN) aims to promote energy efficiency in the broader South African business sector through a platform for knowledge sharing and capacity development. This is not an easily achieved goal, but we have good reason to be proud of our achievements.

Progress with energy efficiency offers some buffer against rapidly escalating energy costs and for some companies an opportunity to optimise operations whilst also improving their overall environmental performance.

The case studies in this booklet provide an opportunity to learn from the good work that other member companies are doing, and they demonstrate how the EELN's activities have leveraged the upscale of energy efficiency among private sector businesses.

This is demonstrated in these case studies by showcasing viable interventions that provide business solutions to the crippling effects of rising electricity and fuel costs on their bottom line and overall competitiveness.

This work has enabled the NBI secretariat to report progress on what some of its members are doing to make continuous improvements, and I look forward to your support in delivering our shared goals for improved energy efficiency and environmental gains.

Best wishes,

Stan Pillay
EELN Chairman

THE EELN PLEDGE

Pillar 1

Members of the Energy Efficiency Leadership Network pledge to develop a roadmap or plan for improved energy efficiency in its operations, supported by the implementation of an appropriate energy management system.

THE EELN PLEDGE

Pillar 2

Members of the Energy Efficiency Leadership Network pledge to develop internal energy efficiency targets that are appropriate to its operations and activities and which respond proactively to, and are aligned with, appropriate government policies and strategies.

THE EELN PLEDGE

Pillar 3

Members of the Energy Efficiency Leadership Network pledge to report appropriately on efforts to promote energy efficiency and progress made towards set energy efficiency improvement targets in its operations within the parameters of national legislation.

THE EELN PLEDGE

Pillar 4

Members of the Energy Efficiency Leadership Network pledge to work with stakeholders on energy efficiency related issues to build capacity and develop the required skills to implement energy efficiency programmes and drive the required behavioural changes.

Engen saves more than R2.3 million across dealer network with lighting project

By convincing its service station owners to review their forecourt lights, Engen improved security for staff and customers and cut power bills by about 70% in each of the first two years of the project.

With a capital investment of R5 million, the replacement of inefficient lights will pay for itself within two to three years. The company saved over R2.3 million in the first two years of the project, 2012/13, and is still rolling out the initiative to include more retail outlets.

Engen at a glance

Engen is an African energy company that markets fuels and lubricants from its refinery and plants in Durban. It is a founding member of the Energy Efficiency Leadership Network. The company employs 4 000 staff at its plants and has 1 063 service stations across South Africa, Lesotho and Swaziland. The Engen network has a capacity of 135 000 barrels of fuel a day, with products including petrol, diesel, jet fuel, kerosene, liquefied petroleum gas, fuel oils, lubricants, hydrocarbon solvents, polymers and bitumen.

Better lights and smaller bills

In 2012 Engen began an energy efficiency project to help owners of its retail outlets to save on energy costs by replacing conventional lighting fixtures with energy efficient LED lights. The project has resulted in energy cost savings in excess of 60% per year across the Engen network. In 2012 electricity bills were reduced by 69%, and Engen saw a further 68% energy saving in 2013.

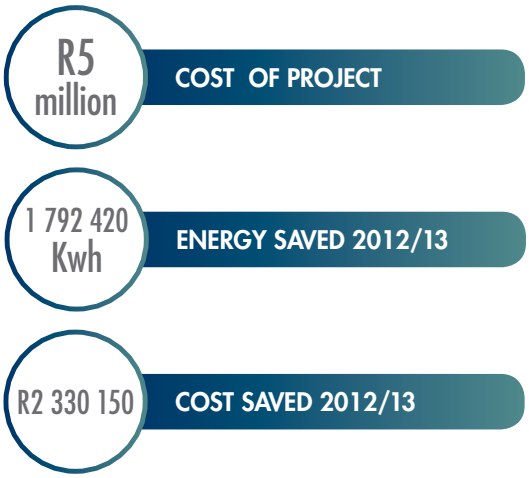
A secondary aim of the lighting project was to improve forecourt lighting for better staff and customer security, and the project gave Engen the opportunity to modernise its outlets.

A SHIFT IN THINKING

The biggest challenge Engen faced while rolling out its energy efficiency project was that service station owners carried the costs of the light retrofits, and did not always feel that the expense was justified. It was a difficult leap for some, but now that the gains are being demonstrated, it is becoming easier to show the value of such projects in the long run.

Engen's lighting project cost approximately R5 million and it was funded internally. The payback period is only two to three years. Given the lifespan of the installations – up to 15 years – the initiative has significant benefits and has been a success.

In 2012 electricity bills were reduced by 69%, and Engen saw a further 68% energy saving in 2013.



from lights to solar

Engen fits energy saving LED and fluorescent light fixtures to all new service stations, and in future will improve lights used to illuminate Engen signage at new and existing outlets, as well as initiating a solar geyser, PV panels and heat pump rollout for its network.

Telkom saves approximately 16 million kWh from 2012

Telkom has made extensive energy efficient upgrades to its lighting and has introduced smarter fleet habits and approximately 850 new fuel-efficient vehicles. During the past year, the telecommunications company saved more than 4.6 million kilowatt hours per year at a single facility.

Telkom believes that further energy efficiency initiatives will be successful with top management support.

The company is developing energy efficiency targets to further drive savings. It focuses on employee awareness and corporate support for energy efficiency.

Telkom at a glance

Telkom is an established South African telecommunications provider, with services from fixed-line voice to data operations and mobile. It employs more than 19 000 people across 52 151 sites, as of 31 March 2014.

In 2009 Telkom began rolling out energy efficiency initiatives in its facilities and fleets nationally – motivated by a need to cut costs and energy consumption, and to reduce the company's carbon footprint. It started to realise these benefits in 2011.

Reducing energy consumption

Since 2009 Telkom has been installing energy efficient lighting replacements at its facilities nationwide. In the first phase, T5 fluorescent lights were installed to replace T8 and T12 fluorescent lights, which are less efficient (LED tubes were not yet approved/ certified by both SABS and Eskom IDM at the time of inception, hence the decision to use T5s). In the next two phases, Telkom installed LED lights (LED tubes, LED high bay lights, LED down lights) in the place of old inefficient lights. These two phases covered around 270 Telkom buildings.

The project was funded by Eskom, with no investment costs required from Telkom to date, and communicated to staff via newsletters, showing where employees could get involved and make energy efficiency suggestions to its Energy Services Company, TFMC.

Efficient cooling

Telkom's Bellville datacentre in Cape Town uses ambient air controls to regulate temperature, saving an estimated 4.7 million kilowatt hours annually. Tank chillers and clip-on units are currently being replaced with more efficient units at other Telkom facilities.

MODEL

freecooling

Free cooling uses naturally low air temperatures to help cool water to be used in air conditioning in order to save on the high electricity consumption that air conditioning units can incur.

Smarter fleet management

Telkom has introduced a travel management system that improves efficiency in its transport networks. Developed and funded internally, it allows for smarter dispatching of vehicles and improved management of technicians' travel, which reduces emissions and fuel consumption. Routes are managed to reduce kilometres travelled. Staff members have received training to manage driver behaviour, and Telkom started monitoring driving techniques such as harsh braking and acceleration, or excessive idling. The training and monitoring of drivers in Gauteng, where it ran as a pilot project, has been successful enough to warrant a rollout in other regions where Telkom operates.

In 2014 the company replaced approximately 850 one-ton vehicles in its travel fleet with fuel-efficient half-ton delivery vehicles, and has seen carbon emissions decrease by 18% from 2012.

Leading from the top

Telkom is currently developing additional energy saving targets. The telecoms company has found that lack of awareness of potential gains from improved efficiency can be a barrier, and that energy saving initiatives can be difficult to fund without government partnerships.

Telkom advocate Ouma Rasethaba says the company aims to participate in government energy-saving initiatives such as the tax deductions set out in section 12L of the Income Tax Act, and highly values the quality of data used to set accurate

baselines and targets. Telkom believes that further energy efficiency initiatives will be successful with top management support.

Looking ahead: Next Generation Network

Telkom has begun phasing in upgraded digital switching units that use less power. The Next Generation Network, Enterprise and Consumer (NGNEC) programme involves replacing the legacy Time Division Multiplexing (TDM) network with MSAN (multi-service access nodes), fibre deployment and wireless technology. These upgrades will provide customers with a much faster service. The result of the network transformation will mean Telkom's legacy digital primary and secondary switching units, which require lots of energy and cooling, will become redundant. These initiatives all lead to a more energy efficient network.

SMARTER TRAVELLING

Telkom's subsistence and travel policy requires employees to consider video-conferencing or teleconferencing as an alternative to travelling, and the policy encourages sharing car rental and shuttle services, and using public transport where possible.

switching units

Switching units are used to complete a dedicated transmission path from sender to receiver at the time of transmission

New technology cuts energy bills by more than 20%

By adopting a new smelting technology, Glencore Merafe PSV reduced its energy consumption by more than 20% at an aging ferrochrome smelting plant. The R800m investment is expected to be recouped inside two years.

The company recognised the inefficiencies in its Rustenburg plant as early as 2004, and in 2010 started the Tswelopele energy saving project. In 2013 the project was a co-winner of the Industrial Award at the Eskom Eta Awards.

For more than a decade, Glencore Merafe PSV has been investing in programmes to improve its furnaces. A total of R6.7 billion has been spent on smelters, and an additional R1.6 billion spent on improved energy efficiency.

The Tswelopele project was funded internally by Glencore Merafe PSV.

The Tswelopele project was joint winner of the Eskom-sponsored Eta Awards in 2013.

The Tswelopele Project

The Tswelopele project is an R800 million investment made at Glencore Merafe PSV's Rustenburg ferrochrome smelting complex. Ferrochrome smelting uses large amounts of energy and the Rustenburg plant was the company's biggest energy user. Project leader Dr Jurg Zaayman and his team revamped the plant using new pelletising and sintering technologies to improve the raw-material input. Today the furnaces are far more energy efficient.

The technology, developed by Outotec in Finland, also resulted in up to 30% more ferrochrome being produced from the same amounts of ore.

TSWELOPELE means "progress" in Setswana

The new technology

Pelletising and sintering chrome improves the raw material in order to save energy, as physical losses are reduced significantly. The product is produced with the same raw-material and energy input, but less is wasted. This reduces the need to construct a new furnace, as well as reducing production costs, air emissions and waste generation.

The Tswelopele plant processes fine ore from mines, and turns the ore into pellets by mixing a slurry of ore with a binding agent. A sinter furnace burns at 1 400°C to form the pellets, which are then cooled with circulated air.

While being sintered, the mineral structure of ore is broken down to assist with the chemical reduction of the pellet to ferrochrome. This enables better permeability for easy gas flow in the furnace and also improves the furnace stability. Pelletising creates minimal dust and produces no effluent.

7000 PERMANENT EMPLOYEES

at six semi-closed furnaces and two sinter plants

R800 million COST OF PROJECT

sintering

Forming a solid mass of material by applying heat or pressure without melting the material into a liquid.

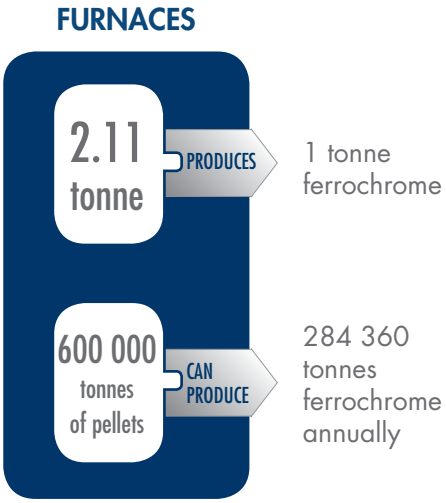
A wider view

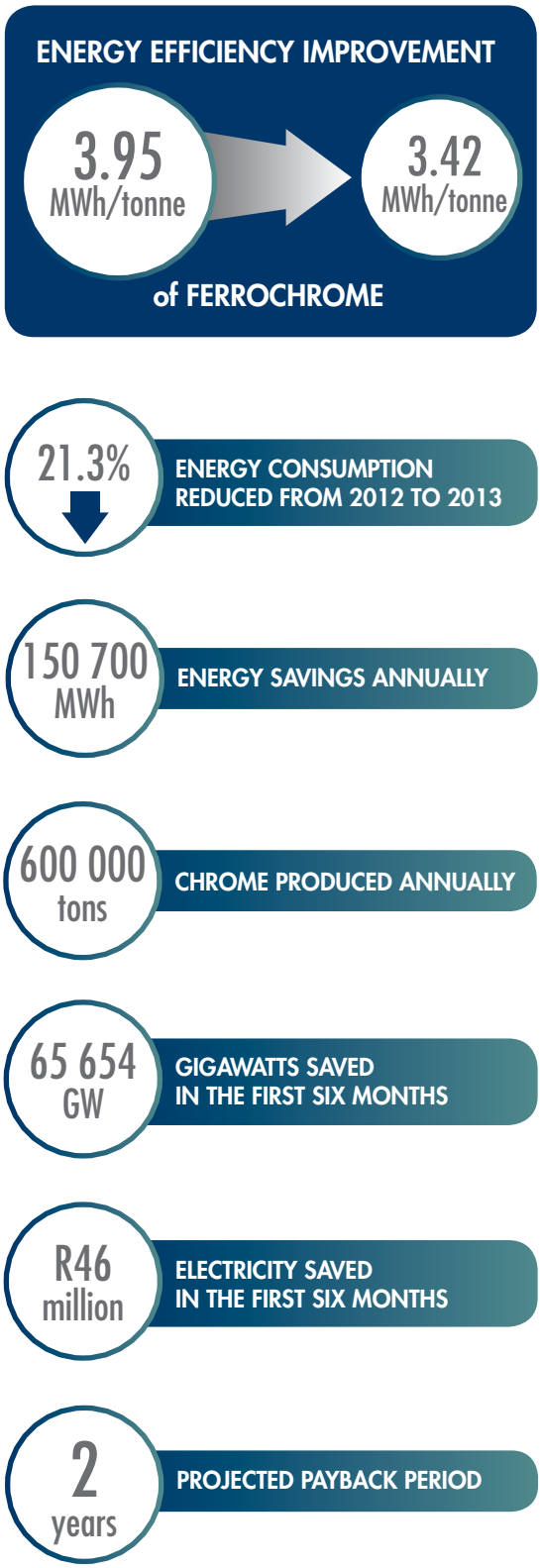
Tswelopele is one of five Glencore Merafe PSV projects aimed at improving energy efficiency, with more than 25% electrical energy savings across the Glencore Merafe PSV group.

The company's energy efficiency has improved from 3.95 megawatt hours to 3.42 megawatt hours per tonne of ferrochrome, saving 65 654 GW in the first six months alone. This equates to a saving of R46 million in electricity bills.

The Tswelopele project follows on a similar project at Glencore Merafe PSV's Wonderkop and Boshoek smelters, and lessons learnt were incorporated into the project at the Rustenburg plant right from the start. As a result, the project was a success and the installation went smoothly.

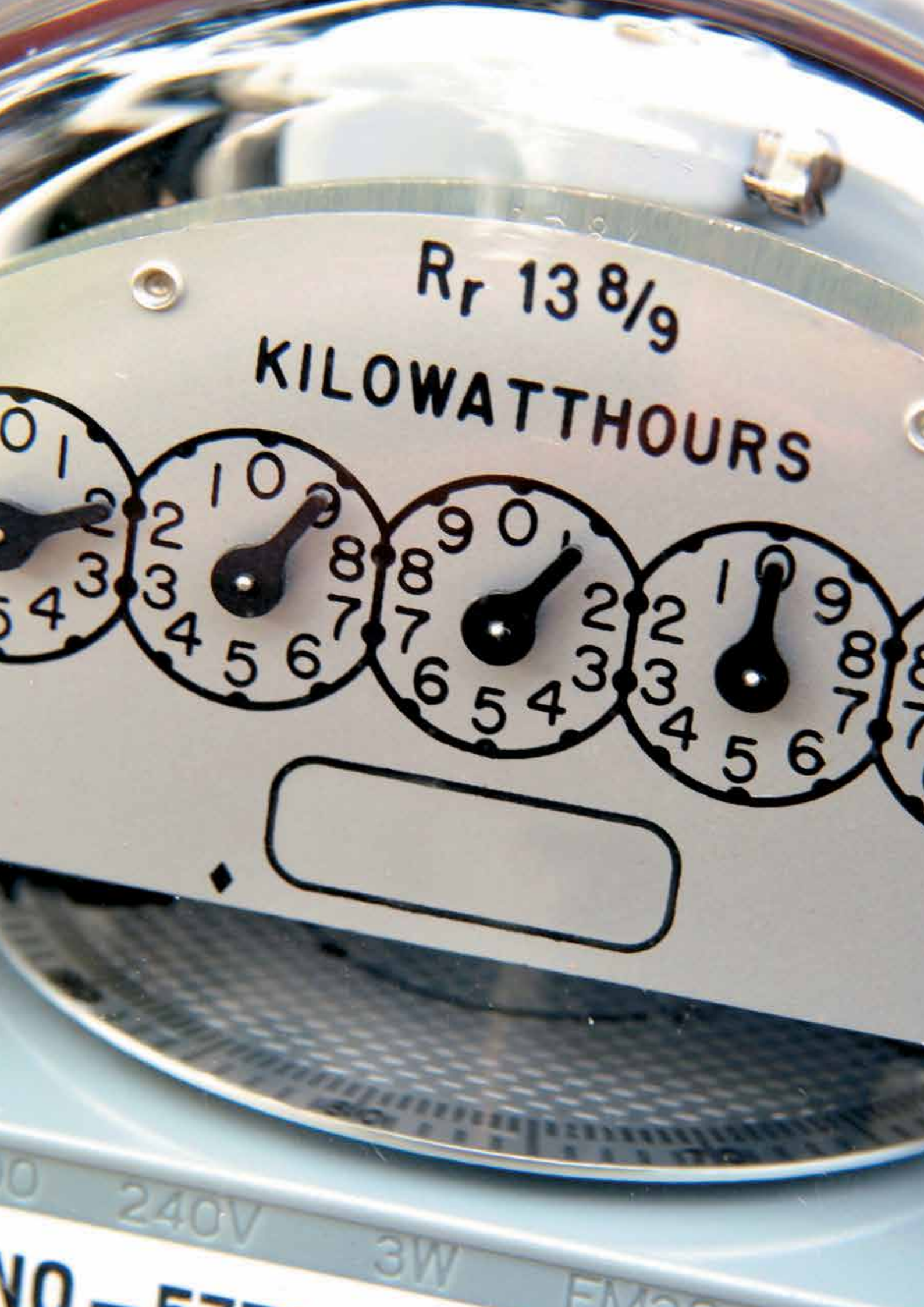
Looking forward, Glencore aims to focus its energy efficiency efforts on recovery of heat wasted within its facilities, and further streamline its operations under the banner of the Lion II project.





the Tswelopele project

Tswelopele has been so successful that the original designers of the technology, Outokumpu, have recreated the design at its own facility in Tornio, Finland. The process can be implemented by any producer and is simple to recreate.


Rr 138/9
KILOWATTHOURS
240V
3W

Transnet saves about R50m annually on electricity costs by regenerating energy in new locomotives

Transnet is a State-owned Company (SOC) of the Government of the Republic of South Africa and the custodian of the country's railway, ports and pipelines.

Transnet at a glance

Transnet's primary business is freight logistics services. Transnet has a responsibility to unlock economic, social and environmental value through executing its mandate whilst building a commercially viable business enterprise. Transnet has a coordinating Corporate Centre and five operating divisions – Transnet Freight Rail, Transnet Engineering, Transnet National Ports Authority, Transnet Port Terminals and Transnet Pipelines. A total of 54 671 people are employed by Transnet.

Energy efficiency

Transnet takes a proactive approach to energy savings, particularly as its Market Demand Strategy requires up to 66% more electricity over seven years than the company currently consumes. In 2013/14, energy cost constituted 18% of Transnet's total operating costs, and it is rising annually.

Transnet is improving energy efficiency by implementing the ISO 50001 energy management system, introducing a range of energy efficiency initiatives and creating awareness through an internal energy efficiency campaign "Every Watt Counts".

Regenerative energy

In line with Transnet's strategy to move more cargo on rail in order to reduce South Africa's logistics costs, improve road safety and lower transport sector carbon emissions, Transnet is investing extensively in new locomotives for the freight rail system. All the new rolling stock comprises optimal technology applications for energy efficiency.

In 2011/12 Transnet procured 186 locomotives with regenerative braking technology to recoup large amounts of energy otherwise lost during braking applications.

Using regenerated electricity on Transnet's overhead track-equipment system is most effective when there is a loaded train waiting to use the regenerative energy. Systems have been designed to maximise this. Trains are scheduled as far as possible to ensure that while one train is regenerating electricity by braking to maintain or reduce its own speed, another train (often going in the opposite direction) is available to absorb the electricity.

The 186 new-technology locomotives were deployed on Transnet's heavy haul lines. Seventy six Class 15E locomotives were deployed on the Sishen – Saldanha iron-ore export line, while 110 Class 19E locomotives were deployed on the Ermelo – Richards Bay coal-export line.

Trains are scheduled as far as possible to ensure that while one train is regenerating electricity by braking to maintain or reduce its own speed, another train is available to absorb the electricity.

regenerative braking (regen)

Regen is an energy recovery mechanism in which the kinetic energy used for braking is converted into electric energy that can be stored and re-used. When braking, the energy used to bring a moving object to a halt is lost as heat and friction. Regenerative braking recovers this energy.

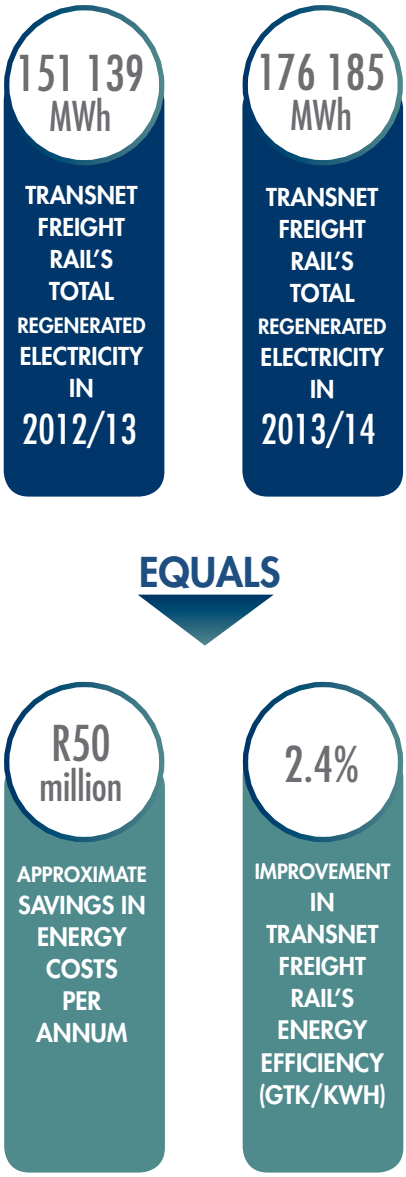
Transnet's regenerated electricity is transmitted back into the Eskom grid if no immediate recipient is available within the traction circuit of the train.

A total of 176 185 megawatt hours of electricity regeneration was recorded in Freight Rail during 2013/14, an improvement of 16.6% on the previous year:

- Class 19E locomotives working on the coal line regenerated 27% of energy consumed on a round trip between Ermelo and Richards Bay. This resulted in 76 682 megawatt hours (14%) energy regeneration in 2013/14.
- Class 15E locomotives working on the iron-ore line regenerated 28% of energy consumed on a round trip from Sishen to Saldanha. This resulted in 99 502 megawatt hours (24%) energy regeneration in 2013/14.

Transnet's regenerated electricity is transmitted back into the Eskom grid if no immediate recipient is available within the traction circuit of the train. In order for Transnet to receive credits for the excess electricity transmitted back into the grid, network studies are being undertaken for compliance purposes and to conclude agreements with Eskom.

Additional metering equipment has been installed at various locations where new-technology locomotives are deployed to monitor and optimise regenerated energy. Transnet Freight Rail is also investigating on-board metering for real-time energy efficiency monitoring by train operations.



regenerative braking in cranes

In Transnet Port Terminals, new container cranes regenerated 347 000 kilowatt hours of electricity in 2012/13. This regenerated electricity is re-used by the cranes themselves, resulting in a net electricity saving.

Lessons learned

The biggest challenge faced during the project was the metering of the regenerated locomotive energy, as well as the licensing for electricity generated. (See infographic, right).

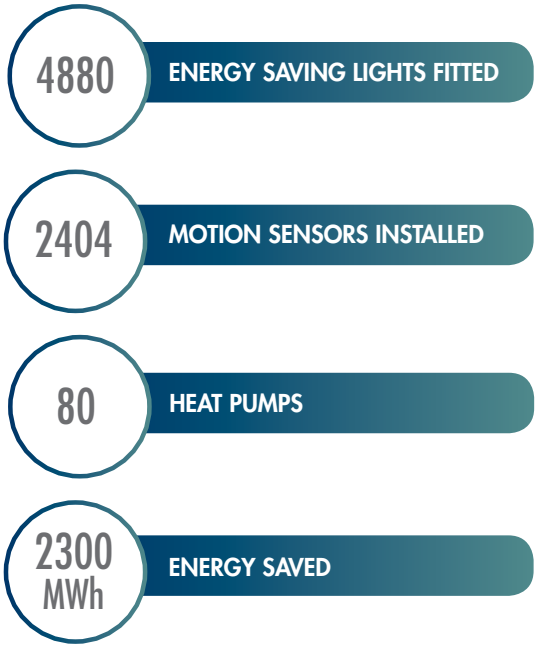
Lighting and water heating retrofit

During 2013/14 Transnet Engineering implemented a lighting and light-sensor replacement project at Transnet Engineering offices and facilities, replacing 4 880 energy efficiency lights and 2 404 lighting-motion sensors. Geysers were replaced with 80 heat pumps and hot plate stoves were replaced with microwaves at all facilities nationwide incurring savings of 3,5MW or 2 300 megawatt hours. The projects were co-funded through Eskom's Integrated Demand Management (IDM) scheme.*

Energy efficiency initiatives

A number of energy efficiency initiatives are being implemented across Transnet's operational divisions and a number of options are being investigated.

The following sustainable energy options for Transnet equipment use are currently being explored by the Transnet Research & Development unit at Transnet Engineering which focuses on the operationalisation of new, relevant technologies:



- Natural gas as a fuel source for locomotives and other equipment;
- Fuel cells on locomotives as alternative energy sources;
- Wagon covers to
  – reduce energy loss through drag effects
  – harness wasted energy by capturing and re-using heat from exhaust systems; and
- Second generation biofuels for diesel locomotives and port equipment.

* The recorded energy savings still to be confirmed by the measure and verification body.

AngloGold Ashanti recoups efficiency investment of R6.7 million from a single project

AngloGold Ashanti is a multinational mining company with operations across ten countries, high energy consumption and a recognised need to implement energy efficiency.

Mining uses a lot of energy, but also produces energy as heat. AngloGold Ashanti has implemented a waste-heat recovery system.

In 2008 the company achieved its 15% energy reduction target, and is currently 25% below the 2008 consumption levels. By using heat-recovery technology and variable speed drives (VSD), AngloGold Ashanti's R6.7 million investment in conjunction with Eskom has already seen savings exceed the capital cost, with the VSD project saving the company more than R7 million annually.

AngloGold Ashanti at a glance

JSE-listed AngloGold Ashanti is the world's third largest producer of gold, with operations in 11 countries. Its South African operation contributes about 32% of total production, consuming up to 240 million kilowatt hours a month mining gold and uranium. In 2005 AngloGold Ashanti targeted a load reduction of 15% of current energy consumption. The company has since set a new target for the future.

Recovering wasted heat

Mining uses a lot of energy, but also produces a lot of energy as heat. AngloGold Ashanti implemented a waste-heat recovery system at its Moab Khotsong gold mine in North West province. The project, partly funded by Eskom, was driven by a need to cut costs and energy consumption, and required an investment of R2.4 million.

VARIABLE SPEED DRIVES

Variable Speed Drives are used to operate sewage, irrigation and pumping facilities, or dairy, paper, conveyor and hospital ventilation machines. Flow is usually controlled by valves and offer little reduction in motor power required.

Variable speed drives save energy because of their ability to use management software to control the flow rate, by changing the frequency of supply and hence of the motor.

This allows pumps to be intelligently controlled to match the requirements of the operations they are driving, such as regulating airflow in a building, or the intensity of water flow in the mining industry. Instead of driving pumps at the same rate regardless of requirements, VSD drives do not waste energy where it is not needed.

plc

A Programmable Logic Controller is a computer used in automation to control assembly lines and machines.

THE PRINCIPLE OF USING VSDs to control flow has become commonplace, and AngloGold Ashanti is investigating the feasibility of implementing the drives at other stations where water flow is currently controlled with valves or by manually switching pumps on and off. "VSDs are expensive, but the savings opportunities are most often worthwhile," says Riaan Rankin.

Four engineers were brought in to implement the heat recovery system, which is based on a system already used at another of AngloGold Ashanti's South African operations.

Heat recovery the right fit

Heat recovery was deemed the most efficient option for AngloGold Ashanti to save energy on its large-scale operations. The scale of the Moab Khotsong project fits perfectly into AngloGold Ashanti's required project-size bracket, with heat-recovery systems becoming economically viable over a threshold energy requirement of 250 kilowatts.

A compressor after-cooler recovers heat via a primary circulation system and uses it to heat water. Plate-heat exchangers are used to heat the water instead of electricity from the grid. A pump with a variable speed drive and PLC programming is used, and the system was designed using the Flownex Simulation platform.

Between 4800 and 14 400 kilowatt hours of energy is saved daily, depending on how much water requires heating, and these savings have brought the mining operator closer to achieving its energy saving targets.

38 400 Kw HOURS SAVED DAILY

R7.6 million SAVED ANNUALLY

R6.7 million INVESTED TO REACH ENERGY SAVING TARGETS

Great control for better efficiency

At the company's Great Noligwa mine in the North West province, variable speed drives were installed on the Fridge plant's evaporator and condenser pumps. Variable speed drives control flow more efficiently, lowering the power consumption of the pump dramatically in contrast to valve control. The project, which required two external project engineers and was co-funded by Eskom and AngloGold Ashanti, was implemented to reduce energy costs at the mine. Similar installations have subsequently been done at some of the company's other operations.

At the company's Great Noligwa mine in the North West province, Variable Speed Drives were installed on the Fridge plant's evaporator and condenser pumps.

plate-heat exchanger

Using metal plates, plate heat exchangers transfer heat to fluids over a large surface area, with the fluid spread out in pipes between the plates. Heat is transferred efficiently and temperatures raised very quickly.

Growthpoint designs and retrofits energy initiatives to save tenants more than R62 million a year

Property investment company Growthpoint is acutely aware of its impact on the environment and continues to expand its environmental commitment.

...Growthpoint uses solar and renewable energy sources where possible in the design of new properties.

The company aims for sustainability in its new buildings and is doing energy-efficiency refits at its older buildings, where it has seen an electricity saving of nearly 80 million kilowatt hours.

Growthpoint at a glance

JSE-listed Growthpoint Properties Ltd is a founding member of the Green Building Council of South Africa (GBCSA), and is recognised for a portfolio of award-winning green-rated buildings using environmentally responsible design and technologies.
It is the largest property owner in South Africa, and is replacing inefficient lighting throughout its portfolio. In addition, Growthpoint uses solar and other renewable energy sources where possible in the design of new properties.

Green initiative lighting project

In response to a rebate provided by Eskom, Growthpoint gave clients the opportunity to participate in its national green initiative lighting upgrade, replacing old lights in more than 100 office buildings across Johannesburg, Durban and Cape Town.

R83 161 677 COST OF PROJECT

78 529 869 kWh p.a. ELECTRICITY SAVINGS

R62 823 895 per annum[1] COST-SAVINGS POTENTIAL

21 527 houses per month EQUIVALENT OF ELECTRICITY

[1] Savings approximated at an average tariff of R0.80/kilowatt hours

the green building council of south africa

The GBCSA is an independent, non-profit company that was formed in 2007 to lead the greening of South Africa's built environment. The council promotes, encourages and facilitates green building in the South African property and construction industry.

The selected retrofitted lights are not only more energy efficient, but are also more cost effective, as they have a longer operating lifespan. The lights come with three-year product warrantees, reducing client costs and saving on maintenance. Fluorescent lights were replaced with energy efficient T5 tubes and LED down lights. Across the various buildings, an expenditure of R83 161 677 over a three-year period from June 2011 to June 2014 has resulted in an electricity saving of 78 529 869 kilowatt hours per annum.

Green Addendum reinvests in sustainability

Commercial, industrial and retail properties have been identified as large global energy users. The lighting rollout is the first project in Growthpoint's Green Addendum – a contractual agreement with clients to reduce energy and water consumption.

Over 100 buildings — **UPGRADED WITH ENERGY EFFICIENT LIGHTS**

77 756 tons CO_2 — **REDUCTION IN CO_2**

The savings on occupants' utility bills is split equally between the company and the leaseholder. Growthpoint's 50% share in energy savings will then go to funding and continuing future green initiatives. The agreement requires a commitment from both parties towards energy efficiency.

Growthpoint's 50% share in energy savings will then go to funding and continuing future green initiatives.

GREEN STAR SA

The Green Building Council of South Afirca developed Green Star SA to provide the commercial property industry with an objective measurement for green buildings. It recognises and rewards environmental leadership in the property industry. Buildings are judged on categories such as management, indoor environmental quality, energy, transport, water, materials, land use and ecology, emissions and innovation.

T5 lights

"T" is a size-code used to differentiate between different fluorescent bulbs.
T5 is the most efficient of fluorescent lights, and performs well in warm climates.

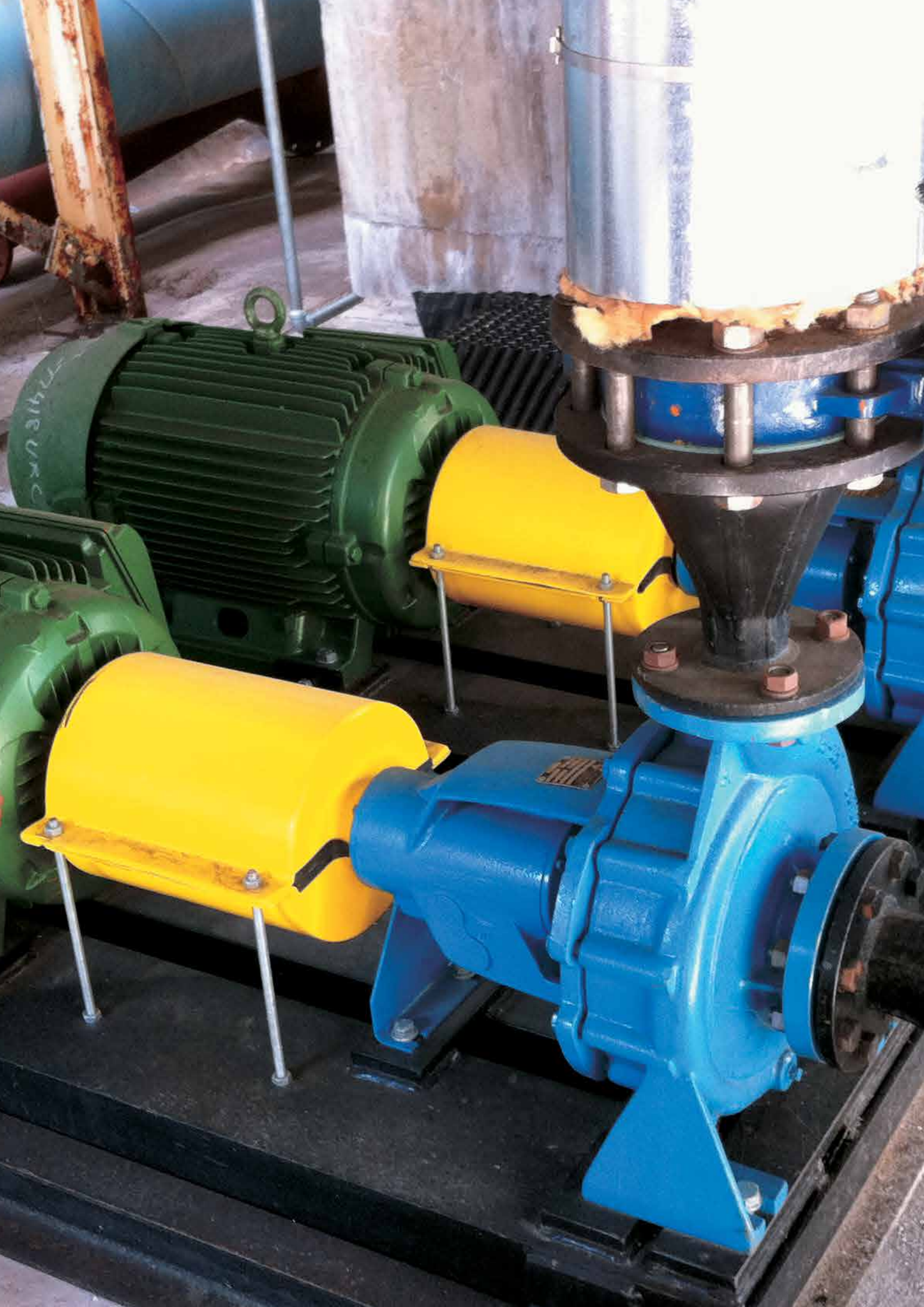


ABB designs head office for optimum energy efficiency of 80W per square metre

Energy company ABB's head office and manufacturing and logistics centre has been designed with a focus on architecture and facilities management automation for resource efficiency.

The new 17 800m² office space in Edenvale houses more than 100 employees and opened its doors in 2009. The building boasts an impressive energy usage of 80W per square metre, and uses ABB's own technologies to achieve its energy efficiency levels.

ABB at a glance

ABB is a 120-year-old energy company that supplies power and automation technologies to utilities and industry. The Swiss group is the world's largest builder of electricity grids, with technologies used in the extraction of resources, electricity production, transport and building.

In South Africa, ABB employs almost 1 800 people, with headquarters in Edenvale and three manufacturing sites. In 2009, ABB finished construction of its new Longmeadow head office near Modderfontein in Gauteng. The 96 000m² facility houses office, warehouse and workshop space.

Longmeadow: Efficient design

From the beginning ABB South Africa took decisions to implement efficiency in its Longmeadow premises. ABB's green building policy aims to reduce operating costs and enhance employee satisfaction at its facilities. Managing properties throughout their life cycle in a socially and environmentally favourable manner is a high business priority. This includes using automated lighting and designing buildings to use natural light as much as possible and recovering waste energy.

ENERGY EFFICIENCY MEASURES IN LONGMEADOW

- A central building management system manages lighting and temperature control efficiently
- Collection of rainwater via two attenuation tanks off factory roof
- Solar water heaters for hot water
- Insulated floor and walls
- High efficiency motors for air conditioning
- External louvres cast a shadow on windows to reduce cooling requirements in summer
- Heat-recovery plant recovers heat energy from air conditioning exhaust
- Minimised travelling by centralising operations on one campus
- Energy efficient lighting
- Photosensitive office lights at workstations deactivate 15 minutes after employees leave
- Roof design maximises the use of natural light
- Signage is lit up using solar power.

From the beginning ABB South Africa took decisions to implement efficiency in its Longmeadow premises.

Sustainability manager for ABB South Africa, Chesney Bradshaw, points out that lighting and air conditioning alone account for the lion's share of total energy use in a building and that a 35% saving can be achieved through energy efficient technology and systems. "The return on the investment can be high and the payback period relatively short."

greywater

Water from wash basins, showers, baths, laundry, dishwashers and kitchen sinks is known as greywater, in contrast to blackwater or sewage. Greywater can be used for ablution or irrigation purpose.

A north-facing solar-heating system on the roof heats the water delivered to the showers. This free energy source replaces the need for electrical heating and does not produce carbon emissions.

Building for the sun

A north-facing solar-heating system on the roof heats the water delivered to the showers. This free energy source replaces the need for electrical heating and does not produce carbon emissions. Energy consumption for the building's heating system is also reduced with a heat-reclaim pump system that captures hot air from the air conditioning and diverts it to supplement the building's boilers.

Intelligent lighting

The building's H-shaped design contributes to lower energy demand for lighting by ensuring the office workstations are on the outer edges of the building where they receive natural light. Each workstation is fitted with a photo-sensitive switch that turns the light on when employees arrive at their workstations and off when they leave. All lights are low-energy and all service areas are located in the middle where 12V down-lighters and emergency lighting are installed.

In the factory section, low-energy compact fluorescent lights are fitted. The lighting grid allows individual units in the factory to turn their lights on and off as required and only use lights when needed.

Insulating for efficiency

Building insulation and air conditioning are efficiency optimised at ABB. The basement is open and designed for effective natural ventilation. Fans have carbon dioxide detection meters that automatically turn air conditioning on when the CO_2 reaches a pre-determined level. The fans and air conditioning plant are driven by ABB low- energy, high efficiency, variable speed drives that pick up speed in a slow controlled manner that eliminates high power bursts at start-up.

Temperatures in the basement in winter can be as low as 5°C so the ground floor's

2 200 litres OF WATER CAUGHT FROM 100mm DOWNPOUR OF RAIN

60% OF ABLUTION WATER FROM GREY WATER PLANT

ZERO ELECTRICAL GEYSERS

140 m^2 SOLAR PANELS

125 kW RECOVERED FROM AIR CONDITIONING FOR WATER HEATING

85% OF WATER HEATING POWERED BY SOLAR OR RECLAIMED ENERGY

8% REDUCTION IN SUMMER HEATING COST FROM BUILDING INSULATION

eta awards

ABB was a winner of a top energy efficiency performer award in the industrial category of the ETA Energy Efficiency Eskom Awards in 2009.

200mm-thick concrete slab is insulated with a 100mm deep Styrofoam layer, as are the side walls and the roof of the building. The insulation ensures that the air conditioning plant is 20 – 30% more efficient in maintaining the right temperature.

Sophisticated management software

The ABB building management system (BMS) is programmed to automatically manage energy demands in the building as efficiently as possible. It allows for control over security, power monitoring, air conditioning and fire warnings. The speed of motors driving pumps and fans are controlled by variable speed drives (VSDs), which the BMS uses to match the building environment with the weather conditions and the number of people in the building.

By controlling the speed of the motor so it runs at only the speed needed, energy usage is controlled via the BMS and results in significant cost savings. Lower pump speeds extend mechanical life and reduce maintenance costs.

Looking ahead

ABB aims to continue to integrate its own components into its business solutions, adhering to its green building policy and using its own technologies to increase efficiency. The company is installing its VSDs and energy efficient motors on irrigation pumping systems at 25 farms across South Africa as a pilot project for a large-scale, energy efficiency, self-funded initiative which saves up to 344 megawatt hours annually.

30% REDUCTION IN WINTER HEATING COST FROM BUILDING INSULATION

4 Watts PER BULB – ENERGY SAVED USING EFFICIENT BULBS

25% ENERGY SAVED BY USING VARIABLE SPEED DRIVES IN AIR CONDITIONING UNITS

100mm = DEPTH OF STYROFOAM INSULATION LAYER IN GROUND FLOOR AND WALLS

20% INCREASE IN EFFICIENCY DUE TO GROUND FLOOR INSULATION

80W = ENERGY USED PER SQUARE METRE

ABB aims to continue to integrate its own components into its business solutions, adhering to its green building policy and using its own technologies to increase efficiency.

AfriSam improves energy efficiency in products and facilities

AfriSam has significantly improved the energy efficiency of its plants and products, saving in excess of R60 million in 2013 compared to the year 2000 as a base year purely on improved specific electrical energy use (kWh/t cement). Its project Green Cement significantly contributed to this.

At its Roodepoort operation, AfriSam has installed South Africa's first vertical roller mill (VRM), which uses 24% less electricity than ball mills.

This saving was seen purely on improved specific electrical energy use, or kilowatt hours per ton of cement. Its project Green Cement significantly contributed to this.

AfriSam at a glance

AfriSam is a leading construction materials group with operations in South Africa, Botswana, Lesotho, Swaziland and Tanzania through its 62.5% shareholding in Tanga Cement Company Limited. With over 2 000 permanent employees across six production facilities, the company produces 5.8 million tons of cement annually. From its 17 quarries, the company has a production capacity of over 10 million tons of aggregate, with 42 readymix concrete plants across the region.

AfriSam's slagment business unit, located in Vanderbijlpark, has produced slagment over the last 50 years for the construction of major structures, including buildings, dams, bridges, roads and water retaining structures.

Vertical roller mill

Cement grinding is an energy-intensive process that traditionally uses ball mills and has an average specific electrical energy consumption of 50 kWh/t.

At its Roodepoort operation, AfriSam has installed South Africa's first vertical roller mill (VRM), which uses 24% less electricity than ball mills. The new mill is 20% more expensive, but the payback is seen in every ton of cement milled. The VRM at the Roodepoort plant has the potential to save the company in excess of 6 million kilowatt hours per year.

Coal and electrical energy are by far the biggest costs in cement production, says Gavin Venter, manager of AfriSam's strategic projects. He says the installation of the VRM was an important measure to reduce AfriSam's costs and energy consumption.

This project was not only driven as an energy efficiency improvement project, but has also increased the company's capacity to produce cement using extenders.

The new technology involved a large degree of training and skills development in operations and maintenance both during and after commissioning the project.

6 GWh — POTENTIAL ANNUAL SAVINGS BASED ON IMPROVED EFFICIENCY OF VRM

R0.5 billion — = COST TO IMPLEMENT

24% less — ELECTRICITY USED BY VERTICAL ROLLER MILLS THAN BALL MILLS

R2.5 million — OPERATIONAL COST SAVING IN ELECTRICITY CONSUMPTION

extenders

In order to achieve a higher yield of cement mix, or slurry, extenders are added to the product. These range from gaseous extenders, used to prepare a foam slurry, to silica and powdered coal – which lower the density and weight of slurry without affecting its strength.

Project Green Cement

AfriSam focused on changing the composition of its product by using newly developed low-energy extenders, which are substitutes that decrease the amount of energy-intensive clinker that dominate the composition of a traditional cement mix.

The main driver for Project Green Cement was the optimisation of cement production using extenders with limited or no additional energy requirement. It uses a by-product called Slagment from the steel industry and fly ash from coal-fired power stations.

The thermal and electrical energy saving is significant as extenders only need to be added to the final milling process. They do not have to go through the raw-milling or thermal process in the kiln, therefore consuming 30% less energy for each process.

The development and testing for Project Green Cement, initiated in 2000, was done by AfriSam's cement product technical department, with training provided for staff in advanced composite cements. The technical research and testing make up the only project costs, with no capital expenditure or marketing costs.

30% RAW-MILLING PROCESS ENERGY SAVINGS

30% THERMAL ENERGY SAVINGS

12% ENERGY INTENSITY REDUCTION

CLINKER

The most common type of cement, Portland cement, uses clinker – lumps of sintered limestone and clay from the kilning process. A mixture of raw materials is heated to create clinker, which is then ground to a powder and acts as a strong binder in cement.

Energy efficient culture

AfriSam has implemented an energy management programme at each of its plants, and employed a team of process engineers to achieve the best energy efficiencies out of each plant component. High-energy material-transport equipment, such as pneumatic conveyors, were changed to mechanical conveying systems where possible. These initiatives required significant capital expenditure, but could be justified based on the improvement on energy intensity.

Implementing a new technology requires a culture shift, as well as the development of new skills and knowledge. Consumers also had to be converted to the changed cement composition, and reassured of its performance. The key to the success of these AfriSam projects was good internal and external education and communication.

Looking ahead

AfriSam believes there are many opportunities for further reductions in energy consumption and has identified several new projects. It is working to entrench energy efficiency as a core part of the way AfriSam conducts its business, and not just as a separate focus area.

All future AfriSam mills, including the planned Saldanha and Coega facilities, will incorporate energy-saving electrical vertical roller mill technology.

Slagment – slag cement

Slagment is a product made of 'slag' – which is waste matter separated from metals during ore refining and smelting.

fly ash

A combustion residue of fine particles used as an ingredient in cement that increases the workability of the compound.

South African Post Office projects annual savings of over 10 million kilowatt hours

The South African Post Office has embarked on several energy-saving pilot projects, with a target of 3% reduction in electricity consumption per year.

A successful rollout of energy efficient lighting replacements at 19 mail centres is to be followed by a mass rollout at all of its facilities – around 3 000 in total – and the company is investigating alternative energy vehicles for its comprehensive logistics department.

Using less to get more or the same results is key for the Post Office.

South African Post Office at a glance

The South African Post Office SOC (SAPO) was founded in 1992 as a legal successor to post and telecommunications, which operated under the Department of Communications and currently reports to the Department of Telecommunications and Postal Services under Minister Dr Siyabonga Cwele. The Postal Services Act (124 of 1998) designates SAPO as the universal postal services operator in the Republic of South Africa. The Post Office provides a defined range of postal services to the citizens of South Africa. The company's main activities include letter and parcel delivery, financial services, logistics services and retail. SAPO employs more than 15 500 people across 27 mail centres, and runs an average fleet of 1 450 vehicles.

SAPO's baseline for energy savings was set in 2009/10, with a target to reduce consumption by 3% per year. This followed another target to reduce carbon emissions by 2.5% annually. Several projects have been piloted and are underway at SAPO, ranging from the basic light-retrofitting project, to running alternative energy and electric vehicles.

ALTERNATIVE ENERGY-DRIVEN DELIVERY

SAPO bought a vehicle that runs on compressed natural gas (CNG) as a pilot for its fleet savings targets of 2.5% on emissions. The vehicle is rented at R5 945 per month on a three-year contract, which pays for itself in fuel cost reductions. In comparison to petrol and diesel vehicles, the CNG pilot vehicle can save SAPO R6 500 and R19 252 respectively per annum.

The vehicle is used by the logistics department, and the results were given to relevant stakeholders to determine the feasibility of such a project on a large scale. CNG is readily available on the East Rand in Johannesburg, but outside of this area mobility becomes limited due to sparse supply of natural gas. SAPO is currently conducting research into the operational feasibility of other alternative energy vehicles. Using less to get more or the same results is key for the Post Office, and it recognises the importance of finding alternative ways to generate energy.

Retrofitting lighting

A multi-phased project to replace inefficient lighting across SAPO's centres was driven by energy reduction targets in the company's sustainability strategy.

Funded through an Eskom rebate (Performance Contracting and Standard Offer Product), the highest energy consuming mail centres were chosen for the first phase.

solar water heaters

Traditional electric geysers consume large amounts of energy, re-heating water regularly and inefficiently. Solar water heaters are mounted above solar panels that power the heating element, and hot water is fed down to showers and taps without requiring electric pumps. In domestic use, they can be used to heat tap water and swimming pools.

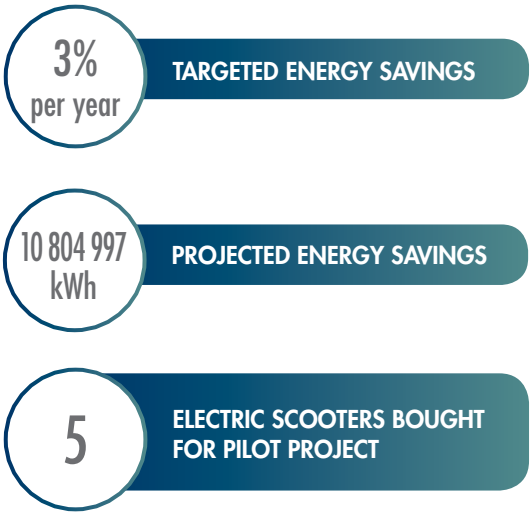
At 19 centres across the country, mercury vapour and incandescent lights were replaced with CFL high bay lights and CFL two-pin respectively. The project, which is a pilot for rollout across SAPO's buildings network, is projected to save 10 804 997 kilowatt hours per year in electricity. Staff were educated about the energy efficient lights via an internal newsletter and presentations at the mail centres.

Mass upgrade

SAPO aims to install better lighting across all of its mail centres (roughly 3 000), as well as geyser timers at 30 depots in the Western Cape, and smart metering for energy and water in all SAPO facilities. A business case is also being developed for 30 depots to be installed with solar water heaters for hot water supply. SAPO says it recommends that companies who want to commence with a project of this scale always do comprehensive planning and get complete stakeholder buy-in beforehand.

ELECTRIC SCOOTERS PILOT

SAPO has bought five electric scooters to reduce carbon emissions and save on fuel. Its mail delivery team in Northern Johannesburg is testing the scooters to determine feasibility in mail delivery, and SAPO is investigating the options of gradually rolling out alternative energy motorcycles across its network.



MERCURY VAPOUR/INCANDESCENT LIGHTING

Mercury vapour lighting is a high-intensity discharge (HID) technology that casts a blue-tinted light and is of the most inefficient in terms of energy usage. Mostly used outdoors, light is produced when a current passes through the vapour inside the glass sheaths. Incandescent lights, while affordable, are equally inefficient, and the higher the wattage of light, the less efficient they are. A wire, or filament, is heated to create light, and the heat energy is wasted.

cfl lights

Compact fluorescent lamps are the light bulbs often referred to as energy-savers. Electricity passes through argon gas and generates ultraviolet light, which activates the phosphorous lining inside the glass tubes. This creates the clear white light attributed to energy-savers.

Energy efficiency saves Woolworths R190 million in four years

New store designs and the adoption of fuel-reducing technology on its fleet has enabled Woolworths to consume up to 31% less energy against its 2004 baseline, with a saving of R190 million in four years.

Woolworths aims for a 40% relative reduction in baseline and energy saving by 2015.

Woolworths now uses 600 000 litres less diesel annually. The internally funded initiative, with some co-funding from Eskom on lighting projects, will be repaid within one to two years.

Woolworths at a glance

The JSE-listed retail group trades as a respected chain store offering customers quality clothing, food, homeware, beauty and financial services under its brand name Woolworths. Employing nearly 22 500 people, it operates over 300 stores and three main distribution centres in South Africa, as well as owning Country Road Group, a leading clothing and homeware retailer listed on the Australian Stock Exchange.

Energy consumption reduction programme

Woolworths aims for a 40% relative reduction in baseline and energy saving by 2015.

Engineering executive Les Hall says the group embarked on the energy consumption reduction programme and sustainable transport programme principally for cost savings, environmental efficiencies and brand reputation.

This energy consumption reduction initiative saw Woolworths implement new store designs with energy-saving features like natural ventilation, automated lighting systems, solar water heating and energy efficient lighting. Management has also introduced alternatives in the distribution process to ensure environmental responsibility.

Woolworths applied technology that uses carbon dioxide (CO_2) as a refrigerant in its stores, as well as light-emitting diodes (LED) lighting, metering online (MOL) systems, remote monitoring of air conditioning and nitrogen refrigeration.

A COOLER COLD

Research by German engineer Hans Quack demonstrated the benefit of using a combined expander/compressor unit in a CO_2 refrigeration cycle to improve the co-efficient of performance and reduce the exhaust pressure of the main compressor in the system. In warmer regions the ambient temperature is higher than the critical temperature of CO_2, meaning the system works in a trans-critical mode. Trans-critical CO_2 systems increasingly focus on using CO_2 as a primary refrigerant.

Sustainable transport programme

Woolworths' sustainable transport initiative enabled it to reduce its fuel consumption via Euro 5 technology – the European emission standards defining acceptable exhaust emissions limits from new vehicles – in conjunction with the Imperial Group. The company bought five trucks with emission standards achieving the Euro 5 level and equipped them with diesel exhaust fluid (AdBlue) technology.

low energy lighting

LED is a two-lead semi-conductor light source and has several advantages over incandescent light,including lower energy consumption, longer lifetime, improved physical robustness, smaller size and faster switching.

that boasts 80% fewer particles and 60% less nitrous oxide emissions.

Route optimisation also reduced the kilometres travelled, introducing cost savings. The company saved around 3000 tons of CO_2 through diesel reductions, achieved efficiency benefits, noise reductions and by improving vehicle refrigeration by using nitrogen refrigeration.

The value of partnerships

Woolworths had internal skills capacity for electrical, transport and refrigeration engineering, but worked with external consultants on new initiatives and key partners included Imperial and Mercedes Benz. They developed a new green building model applied to all store developments audited externally by Ernst and Young.

However, Hall says investment funding, particularly for longer payback projects, poses a barrier to greener energy solutions. The group has learnt the value of MOL to accurately track its progress and savings, while acknowledging partnerships are key to achieving targets.

Management believes it has made significant progress in cutting its relative electricity consumption by 31% and saving substantial capital annually.

Customers make low-carbon choices

Woolworths customers are encouraged to make low-carbon choices through the group's awareness and communication efforts, while employees are educated on energy efficiency through awareness programmes, campaigns and in-store presentations.

Looking ahead

Woolworths plans to engage with suppliers, staff and customers to create an understanding of risks and opportunities for climate impacts. The group will continue assessing the viability of procuring energy from clean sources and learn from the current pilot clean energy projects.

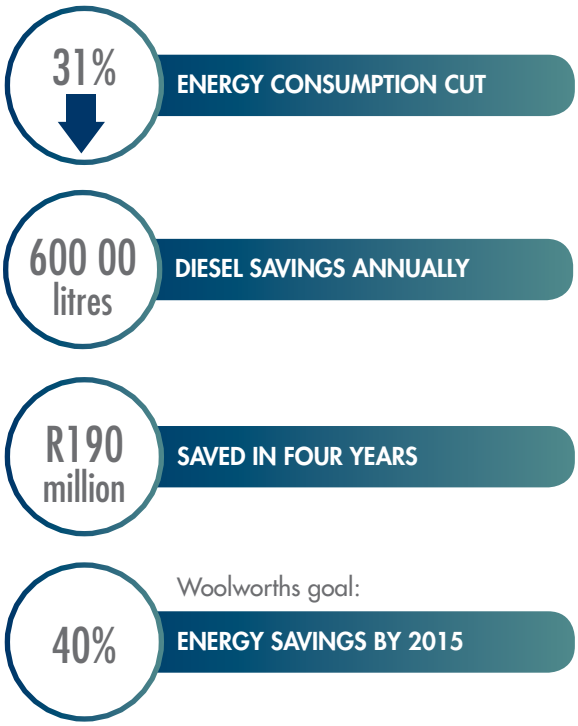
Imperial was aligning its infrastructure to accommodate the bulk rollout of Euro 5 vehicle technology nationally after which Woolworths will aggressively replace its national secondary fleet with these vehicles that use the low sulphur 0.005 ppm diesel.

Management was also engaging with national government and civil society to develop policies and measures that will provide an enabling framework for business to contribute effectively to a low-carbon economy.

The group has learnt the value of MOL to accurately track its progress and savings ..."

METERING ONLINE

MOL offers a systematic and automated online approach to managing electricity, water and gas consumption, both as supply points to manage actual costs, as well as within the industrial plant, particularly where costs and efficiencies can be monitored for large-scale production lines. The system allowed Woolworths to both communicate daily with staff on their energy use and link their performance to energy saving.



AdBlue

Diesel exhaust fluid, or AdBlue, is an aqueous urea solution made with 32.5% high-purity urea and 67.5% deionised water. It's used as a consumable to lower nitrogen concentration in diesel exhaust emissions.

Ventilation overhaul saves R2 million annually and inspires further savings

Anglo American's ECO_2MAN has seen the company implement a measurement and reporting programme for both energy consumption and greenhouse gas emissions that has stimulated several projects at the company.

Anglo American at a glance

Anglo American, a JSE-listed company, employees 82 000 people across six provinces. The company has four mining operations based in South Africa, namely Platinum, Kumba Iron Ore, Coal and De Beers. Its platinum business accounts for around 40% of newly mined platinum globally, and Coal South Africa sells up to 62% of its annual total production to the Eskom power utility.

ECO_2MAN

The company implemented a measurement and reporting programme for energy and greenhouse gas performance known as ECO_2MAN, an abbreviation for an energy and CO_2 management programme. It allows Anglo American to better understand future energy consumption.

The programme includes a self-assessment tool that provides the company with the baseline information it needs as a springboard for strategies, both at site and business unit levels. Then, projects for achieving energy and emissions performance targets are identified and implemented, with accountable energy managers put in place for each project.

Ventilation systems

Ventilation systems at mines are critical to ensure safe working conditions for people underground, as they provide fresh, cool air, dilute and remove flammable gasses, as well as machine exhaust gasses. Since they run continuously – 24 hours a day all year round – they're high energy consumers and require a high level of maintenance.

Consequently, the ventilation fans at Coal were identified as one of the significant energy users (SEUs) as part of the rollout of Anglo American's ECO_2MAN programme. Other SEUs for underground operations include conveyor belt systems and underground machinery.

The two fan stations optimised realised a collective energy saving of 3 335 megawatt hours – enough energy to power 370 mid-sized homes for a year. This translates to an energy cost saving of around R2 million annually.

3335 MWh ENERGY SAVED

R2 million APPROXIMATE COSTS SAVED ANNUALLY

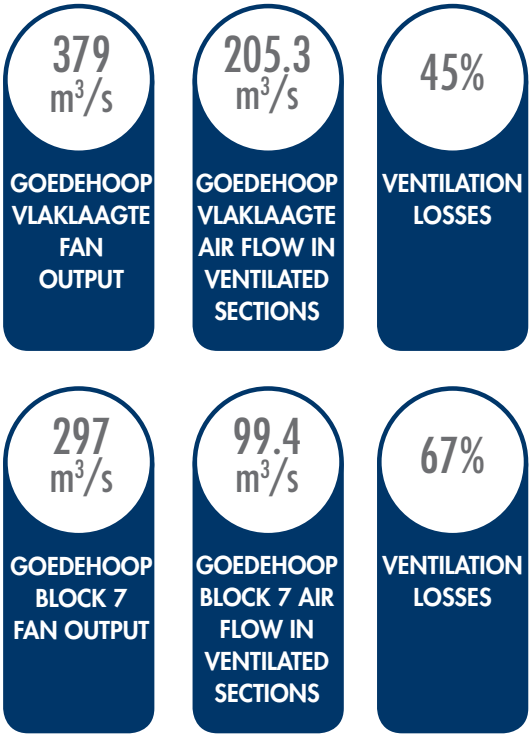
safety first

Energy savings can be achieved without compromising safety by still maintaining good ventilation standards. Anglo American was able to reduce power usage on ventilation systems without comprimising on the safety threshold of $32m^3$ per second (with a velocity of 1.5 metres per second).

The Challenge

Ventilation runs through underground mine areas in order to supply air to sections even at the furthest point from the shaft. While it is necessary to reduce the energy spent on the process, ventilation needs to remain above a certain threshold (32m^3 per second with a velocity of 1.5 metres per second) so as to be safe for employees. The second challenge is that ventilation needed to be more effective – up to 67% of the efficacy of the ventilation was lost between the fan and the areas it was intended for.

BEFORE PROJECT:



Solution 1: Quick win opportunity

The existing ventilation systems found to be operating well above the standard flow rate. Fan speeds were reduced to minimise unnecessary energy consumption.

Solution 2: Low-cost opportunity

Working from the fan station back up to the surface, leaks were identified in the airways of the ventilation system, and fixed. This improved the efficiency of ventilation. In Block 7, the company went so far as to seal off an entire old mining area, which allowed for a fan running at 190kW to be turned off and kept only for emergencies.

Solution 3: Electrical efficiency

When the fan speed or air volume of a fan is reduced, it does not necessarily still run at optimum efficiency. To improve this, inlet guides, gearboxes and motors can be improved and replaced – which requires capital investment. This kind of investment requires long-term planning for each individual facility to determine the financial viability of investments.

Measurement and verification

Energy metres were installed to measure the consumption of the fans. The metres are monitored, and baselines established for each fan. This is used to verify energy savings after the implementation of projects, as well as to provide a performance measure to ensure that savings are maintained.

The domino effect

In addition to the savings, the projects realised a greater awareness of energy efficiency with all involved, and has prompted further assessments of ventilation systems at other underground collieries in Coal. These assessments identified opportunities to the value of just over 2MW (enough to power 1 700 mid-sized homes for a year). Some of these opportunities will require capital investments, but typically have very attractive returns and less than two-year payback periods. These energy and CO_2 – emission savings will contribute greatly towards Anglo American's 2015 ECO$_2$MAN targets.

lessons learnt

Not all energy saving projects require capital to achieve a significant reduction in energy. Going back to basics to ensure equipment and systems are properly maintained is an invaluable exercise.

Barloworld's energy changes an inspiration for customers

Barloworld's energy efficiency drive includes implementing small energy saving initiatives across its network in order to achieve a significant cumulative win.

From installing more efficient compressor units to revamping an entire facility with proximity sensitive lighting, building management systems and smarter shop fronts to control temperatures, the company aims to improve its energy and emissions (scope 1 and 2) efficiency by 12% by the end of 2014 off a 2009 baseline.

Barloworld adopts the measure, avoid, reduce, switch and offset approach (MARSO), implementing a robust measurement and reporting process across their energy efficiency initiatives. This includes not only its own operations, but elements are also applicable to its customer offerings.

Barloworld at a Glance

Founded in 1902, Barloworld operates in 24 countries, with 70% of its 19 141 employees being South African. The company provides rental, fleet management and product support for international brands, as well as logistics solutions. Its core divisions are Equipment and Handling (earthmoving, power systems, materials handling and agriculture), Automotive and Logistics (car rental, motor retail, fleet services, used vehicles and disposal solutions, logistics management and supply chain optimisation).

It offers business solutions backed by brands such as Caterpillar, Hyster, Avis, BMW, Ford, General Motors, Mazda, Mercedes-Benz, Toyota, Volkswagen and Massey Ferguson.

In 2009, Barloworld set a 12% efficiency improvement target for non-renewable energy consumption and greenhouse gas emissions (scope 1 and 2) by the end of 2014.

Underpinning this were commercial imperatives such as reducing operational costs and organisational resilience, as well as a commitment to responsible corporate citizenship.

The group anticipates a significant cumulative effect from numerous initiatives across its operations, including the Barloworld Power business case study and Barloworld Automotive's revamp of its Witbank Toyota dealership.

Small changes for big returns

While individual projects may produce limited energy and cost savings, the cumulative impact across Barloworld sites swiftly mount. Replacing the Barloworld Power Boksburg site's 75kW compressor with a 15kW unit is one example of how small changes improve energy efficiency. The company saves 360 000 kilowatt hours and R400 000 annually (based on current demand and electricity pricing) from the R130 000 investment.

The initiative resulted from energy audits that identified areas for improvement. Internally funded, the project was motivated by projected consumption and cost savings, and the short payback period. Skills required included technical aptitude, the development of a business case, and project management.

U-value

This is the co-efficient of heat transmission and thermal transmittance, measuring the heat lost through a structural element. It is calculated on the rate at which heat transfers through 1m^2 of a structure, such as glass, where the temperature difference between the inner and outer surface is 1°C.

Challenges and lessons learnt

A business case illustrating the project's potential commercial benefit was developed, and the capital expenditure was relatively small. After implementation, energy-related data was recorded and reported against the baseline and projected figures.

During the process, the team had to manage the shift from the old to new compressor without disrupting services and operations.

Successful implementation demands suitable skills and expertise; robust risk management; an inclusive approach and a commercially sensible rationale, says the Barloworld team. Planning that mitigates possible risks is essential both pre and post-implementation.

Energy efficient revamp for Barloworld's Toyota Witbank

Toyota was voted best global green brand in 2013*[1], making it fitting that Barloworld identified its Witbank Toyota dealership for an energy efficiency review and revamp.

Aspects addressed in improving the efficiency of the building included optimal lighting for display purposes, and cooling and heating for employees, customers and others in the dealership.

Keep heat in without shutting eyes out

The existing Toyota Witbank dealership had a north and east-facing showroom, with a glass shop front. The large glass surfaces allow generous amounts of light and heat into the showroom, but also allow heat loss. Since the length of the windows made it unfeasible to install double glazing, single-clear glazing with a low-emissivity coating was installed.

R809 579 COST OF THERMAL EFFICIENT SHOP-FRONT GLAZING

The single-glazing has a U-value of 3.8W/m^{2}C and a shading co-efficient of 0.69, reducing the thermal load without affecting the visibility of the cars on display from the outside.

Adaptive air conditioning

In addition, more energy efficient air conditioning systems were fitted to further reduce energy consumption. A split inverter DX unit provides the individual working spaces within the building with individual control over their air temperature, but makes use of inverter compressor technology which reduces energy consumption by up to 20%*.

ENERGY EFFICIENT AIR CONDITIONING

R706 713 INVESTMENT COST

465 310 kWh ANNUAL KILOWATT HOUR SAVING

R721 230.50 ANNUAL COST SAVING

[1] Toyota has been voted Best Global Green Brand in the Interbrand study conducted annually. For more information, go to www.interbrand.com.

* Please note that the savings figures have been annualised

night audits

Barloworld has been conducting night audits on its Toyota Witbank facility to monitor and evaluate energy consumption outside normal working hours. The initiative has been a success, with night energy consumption comprising 42%* of the total monthly consumption before the audits, and only 27%* thereafter.

Intelligent lighting, intelligent building

Offices at the Witbank Toyota dealership have proximity sensors that switch off lights and air conditioning units when no movement is detected within the space, avoiding energy usage when it is not required. An Intellibus management system switches off showroom units and ventilation fans after normal working hours, and turns on ventilation when staff arrive in the morning. Intellibus is a voltage-control system that allows Barloworld to automatically control the systems that operate at its facilities, making it easier to manage and reduce energy consumption.

The workshops are naturally ventilated, and carbon monoxide tests were done while the facility operated at full capacity to ensure that levels are within the legal requirements.

Lessons learnt

The Toyota Witbank revamp demonstrated that energy can be reduced by applying simple principles and implementing inexpensive technology. Prior to the 2013 upgrade, the dealership consumed approximately 8.6 kW/m^2/month. Following the revamp this has fallen to 7.8 kW/m^2/month.

OTHER ENERGY SAVING MEASURES IMPLEMENTED

- R51 425 — ROOF INSULATION INSTALLED
- R74 746 — TRIAC SWITCHING MODULES ON LIGHTING

ENERGY EFFICIENT LIGHTING

- R388 883 — COST OF LIGHTING
- R531 250 — PROJECTED SAVINGS WITHIN THREE YEARS
- 342 741 kWh — PROJECTED CONSUMPTION CUTS WITHIN THREE YEARS

PROXIMITY AND OCCUPANCY SENSORS

- R110 500 — COST OF SENSORS
- R192 023 — PROJECTED SAVINGS WITHIN THREE YEARS
- 123 885 kWh — PROJECTED CONSUMPTION CUTS WITHIN THREE YEARS

Energy Efficiency Leadership Network Signatories

Glossary

NBI

The National Business Initiative is a member-based organisation. Acting as a collective of leading businesses, the NBI supports sustainable growth and development in South Africa through its various projects, partnerships and policy engagements towards a sustainable future.

EELN

The Energy Efficiency Leadership Network is a network within the NBI that serves as a catalyst for improving energy efficiency in South Africa. Companies that are signatories to the EELN benefit from access to best practice, technical expertise and the experience of others to assist in developing and implementing in-house programmes. It promotes an improved understanding of emissions and energy cost reductions through energy efficiency, as well as the value of contributing to energy security and diversification. The EELN currently has over 50 signatories.

ISO 50001

The International Organisation for Standardisation (ISO) has specified Standard 50001 with requirements for the establishment, implementation, maintenance and improvement of energy management systems. This includes energy efficiency measures, and applies to both commercial and industrial facilities. At its core, ISO 50001 requires continues improvement, outlining six steps to achieving the standard: Have managerial-level buy-in; collect and analyse energy data; identify the building's points of energy consumption; establish a baseline of energy consumption; identify opportunities to reduce consumption; create a system that prioritises energy-saving strategies.

Eskom IDM

The Integrated Demand Management (IDM) division of Eskom was established to facilitate short-term electricity supply security by coordinating energy optimising initiatives. It promoted the implementation of energy efficiency technologies by providing rebates through the following programmes:

- **Energy Efficiency Demand Side Management (EEDSM)** – supporting technology, systems and behavioural process changes made to promote energy efficiency
- **Energy Management Programme (EMP)** – assisting corporate consumers to improve efficiency
- **Solar water heating** – financial incentives to switch to solar heating technologies
- **Energy Conservation Scheme (ECS)** – aims to reduce consumption by 10% among energy consumers using over 25 gigawatts per annum
- **Demand Response (DR)** – appealing to customers to reduce consumption to balance demand and supply.

The National Business Initiative is a registered Public Benefit Organisation (PBO) that was established in 1995. It is a voluntary group of leading companies working together towards sustainable growth and development in South Africa through; strategic partnerships, practical programmes and policy engagement. Our focus is on building a sustainable society through facilitating colloquiums, producing thought leadership material and supporting collective and practical action. In the last two decades NBI has played a leading role in advocating business awareness and action to environmental sustainability issues such as climate change, water and energy efficiency.

The NBI focus on energy efficiency is built around driving both collective and individual action by companies through the Energy Efficiency Leadership Network (EELN) pledge. The pledge requires companies to adopt a coherent, strategic and action-oriented approach to the implementation of energy efficiency. To this end the EELN offer signatory companies, capacity building and workshops on subjects like energy management, capacity building, measurement and verification as well as support on reporting and other strategic interventions e.g. application to energy efficiency incentives. This is to support the measures companies take to conserve energy in their organisations and make a meaningful difference as a collective.

To join the EELN and contribute to a network of forward thinking organisations that have organised themselves to action-oriented approach to improving energy efficiency management contact the NBI's EELN team (See details below).

National Business Initiative Contacts

Ms Valerie Geen – *Head of Energy*
Geen.Valerie@nbi.org.za

Mr Gershwin Pududu – *Project Manager: Energy*
Pududu.Gershwin@nbi.org.za

Dr Peter Mukoma – *Head of Private Sector Energy Efficiency Programme*
Mukoma.Peter@nbi.org.za

National Business Initiative
3rd Floor, Building D, 32 Princess of Wales Terrace
Sunnyside Office Park, Parktown, 2193, South Africa
Tel: +27 (11) 544 6000
www.nbi.org.za